

CLAIMS

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- 5 1. First lift-and-strike welding process, wherein in a first step a surface (5) of a component is cleaned by applying a first voltage so as to strike an arc between an element (4), in particular a stud, which is to be connected to the surface (5), and the surface (5), in a second step a polarity of the first voltage is reversed and wherein the element (4) is then welded on by means of at least one arc struck by means of a second voltage.
- 10 2. Lift-and-strike welding process according to claim 1, wherein the first voltage is set, in terms of its magnitude, higher than a subsequent second voltage of reverse polarity.
3. Lift-and-strike welding process according to claim 1 or 2, wherein the first voltage is adjusted with a positive polarity.
- 15 4. Lift-and-strike welding process according to one of claims 1 to 3, wherein the element is welded onto the component after the component has previously been covered with a coating, in particular a lubricant layer for a cold-forming machining operation, preferably a deep-drawing machining operation.
- 20 5. Lift-and-strike welding process according to one of claims 1 to 4, wherein after a drop of the first voltage a polarity of the first voltage changes in a zero-current state, a welding process using preferably a pilot voltage and subsequent welding voltage then ensues, wherein both voltages have a different polarity to the first voltage.
- 25 6. Lift-and-strike welding process according to one of claims 1 to 5, wherein upon attainment of a passage through zero of the first voltage a zero voltage is maintained for a time, after which a second voltage is built up.
- 30 7. Second lift-and-strike welding process, in particular according to one of claims 1 to 6, wherein

5 - an electric cleaning current flows between a surface (5) of a component and an element to be welded thereon, in that the component rests on the surface (5) and then the element (4) is lifted off the surface (5) up to an approximately, in terms of time, constant distance for removing a coating from the surface (5) through ignition of an arc as a cleaning agent,

- then the current changes its polarity, wherein afterwards at least one welding current is produced and

10 - then the element (4) is welded to the surface (5).

8. Lift-and-strike welding process according to one of claims 1 to 7, wherein the cleaning current assumes a current intensity of between 15 amperes and 500 amperes before it drops.

15 9. Lift-and-strike welding process according to claim 7 or 8, wherein after a reversal of the polarity an, in terms of magnitude, maximum welding current is produced.

20 10. Lift-and-strike welding process according to one of claims 1 to 9, wherein the element (4) is brought back into contact with the surface (5) only after disconnection of the welding current.

25 11. Lift-and-strike welding process according to one of claims 1 to 10, wherein the cleaning current lasts as long as or longer than a pilot current, which flows prior to the welding current, and/or the welding current.

12. Lift-and-strike welding process according to one of claims 1 to 11, wherein the welding current is equal to or stronger than the cleaning current.

30 13. Lift-and-strike welding process according to one of claims 1 to 12, wherein the element (4) during cleaning of the surface (5) assumes a distance (S) from the surface (5)

which is at least two times greater than the distance (S) from the surface (5) during welding, in particular when a pilot current flows prior to the welding current.

14. Lift-and-strike welding process according to one of claims 1 to 13, wherein
5 through the measurement of a parameter a duration of the cleaning step is regulated or controlled.

15. Lift-and-strike welding apparatus (1) having a guide (9) for a weld-on element
10 (4) and a control device (10) or regulator for the guide (9) as well as a device (11) for controlling or regulating the electric current and/or the voltage used for welding, wherein the lift-and-strike welding apparatus (1) comprises a polarity reversing means (12) for the voltage used for welding, characterised in that the device (11) for controlling or regulating the electric current and/or the voltage used for welding is programmed or operated in such a way as to produce, prior to the welding operation, a cleaning current
15 which has a reverse polarity compared to the welding current.

16. Lift-and-strike welding apparatus (1) according to claim 15, characterised in that said apparatus is designed for implementing a process according to claims 1 to 14.

20 17. Lift-and-strike welding apparatus (1) according to one of claims 15 or 16, characterised in that said apparatus comprises a focusing device for an arc which is to be struck.

18. Lift-and-strike welding apparatus (1) according to one of claims 15 to 17,
25 characterised in that the polarity reversing means (12) comprises a shorted circuit for maintaining a struck arc during a reversal of the polarity.

19. Lift-and-strike welding apparatus (1) according to one of claims 15 to 18,
characterised in that said apparatus comprises an evaluation device, particularly for
30 quality inspection, for at least one parameter at least of the cleaning operation.

20. Polarity reversing means (12) for a lift-and-strike welding apparatus in particular according to one of claims 15 to 19, characterised in that the polarity reversing means (12) comprises a circuit element, which produces an arc current in order to maintain a struck arc during a reversal of a polarity of the arc voltage.

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21. Polarity reversing means (12) according to claim 20, characterised in that the polarity reversing means (12) comprises a first (13) and a second (14) power source, wherein the first power source (13) supplies a cleaning current and the second power source (14) supplies a pilot current and/or a welding current.

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22. Polarity reversing means (12) according to claim 20 or 21, characterised in that a coil (15) is connected to the second power source (14) in such a way that a struck arc continues to be maintained during a reversal of the polarity.

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23. Aluminium surface with welded-on element (4), wherein the aluminium surface (5) has or has had a coating (8), in particular a lubricant layer, manufactured using a process according to one of claims 1 to 14.

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24. Steel sheet with welded-on element, wherein the steel sheet surface has or has had a coating, in particular a lubricant layer or a zinc layer, manufactured using a process according to claims 1 to 14.